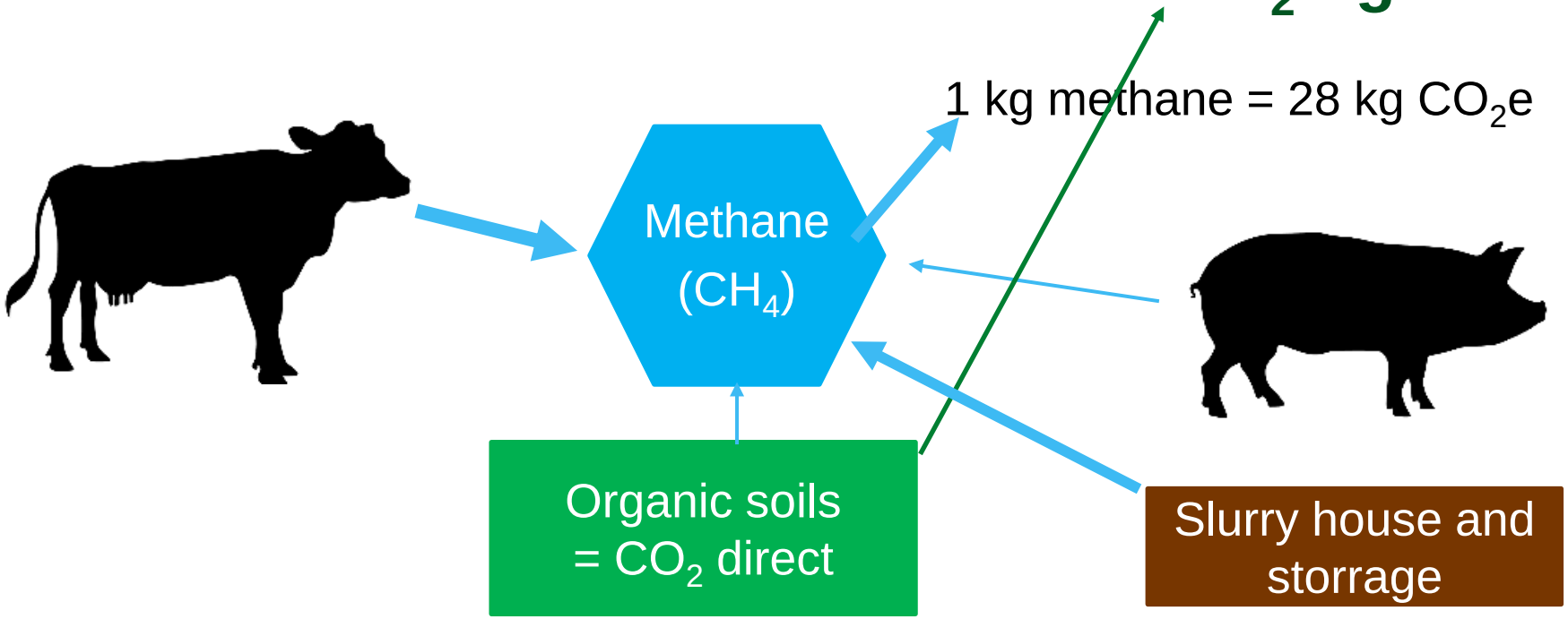
# Climate agenda(s) and pig feed

Per Tybirk, SEGES Innovation, pigs

**Better Incects Solutions 19. june 2023**

# Greenhouse effect i meassured in i $CO_2$-eguivalents ($CO_2e$)



# Greenhouse effect i meassured in i $CO_2$-eguivalents ($CO_2e$)

Methane
($CH_4$)

1 kg methane = 28 kg $CO_2e$

$CO_2$

1 kg $N_2O$
265 kg $CO_2e$

Organic soils
= $CO_2$ direct

Slurry house and
storrage

$NH_3$

Nitrous
oxide
($N_2O$)

Pig slurry
20% more Nitrogen
per ha for same N
quote

Commercial fertilizer

Energy for
making fertilizer

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# Agenda´s and methods, Climate change

Territorial

Production and energy use in Denmark

44 mio ton $CO_2e$

Danish Agriculture

14 mio ton $CO_2e$

Danish ship og air transport abbroad

41 mio tons $CO_2e$

## Denmarks ”Climate law”

70% reduktion fra 1990 i 2030
40% achieved in 2020
Climate neutral in 2050 → now 2045

FN’s Climate panel
Paris-agreement (< 2 $^oC$ goal

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# Agenda´s and methods, Climate change

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41 mio tons $CO_2e$

Consumption based

Produced and consumed in DK

24 mio ton $CO_2e$

Import

41 mio tons $CO_2e$

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# Agenda´s and methods, Climate change

## Territorial

Danmarks produktion

44 mio ton $CO_2e$

Danske skibe og fly i udlandet

41 mio tons $CO_2e$

Danish Agriculture

14 mio ton $CO_2e$

Export from DK

Climate footprint of production counts in i DK

Do not count:

Less $CO_2$ i other countries bying Danish agricultural products

Effect of exported windmills on global climate

## Consumption based

Produced and consumed in DK

24 mio ton $CO_2e$

Import

41 mio tons $CO_2e$

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# Climate change account methods – the two most relevant

LCA-method
(consumption)
$CO_2e$ pr. kg produkt
(fx grisekød)

World level

All climate effects from production

Inkl. dLUC
(regnskovstab)

Excl. dLUC

ESGreen TOOL
Landbrugets digitale klimaværktøj

Denmarks climate acount (territorial)
only climate footprint from production i DK

Denmarks consumption do not count
– except energy used (= included)

Agriculture
30%

Crop production 60% of 30%=18%

Cattle 25% af 30% = 7,5%

Pigs 12% af 30% = 3,6%

Energy and industry / companies
70%

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# Challenges

- **The Government looks at climate law – Production in Denmark**
  - Pig feed only plays a little role - via effect on methane from hindgut and slurry
  - But cattle feeding and slurry management is regulated
  - Main area of determined effort is crop production in Denmark
  - Import of feed ingredients like soybeanmeal do not count at all!

- **Meat industry want to document climate impact from pig meat (LCA)**
  - Feed is very important – especially import of protein
  - Slurry management is also important
  - If Danish crop production can document lower climate impact (Eg $N_2O$ inhibitors) it could be included - if accepted internationally

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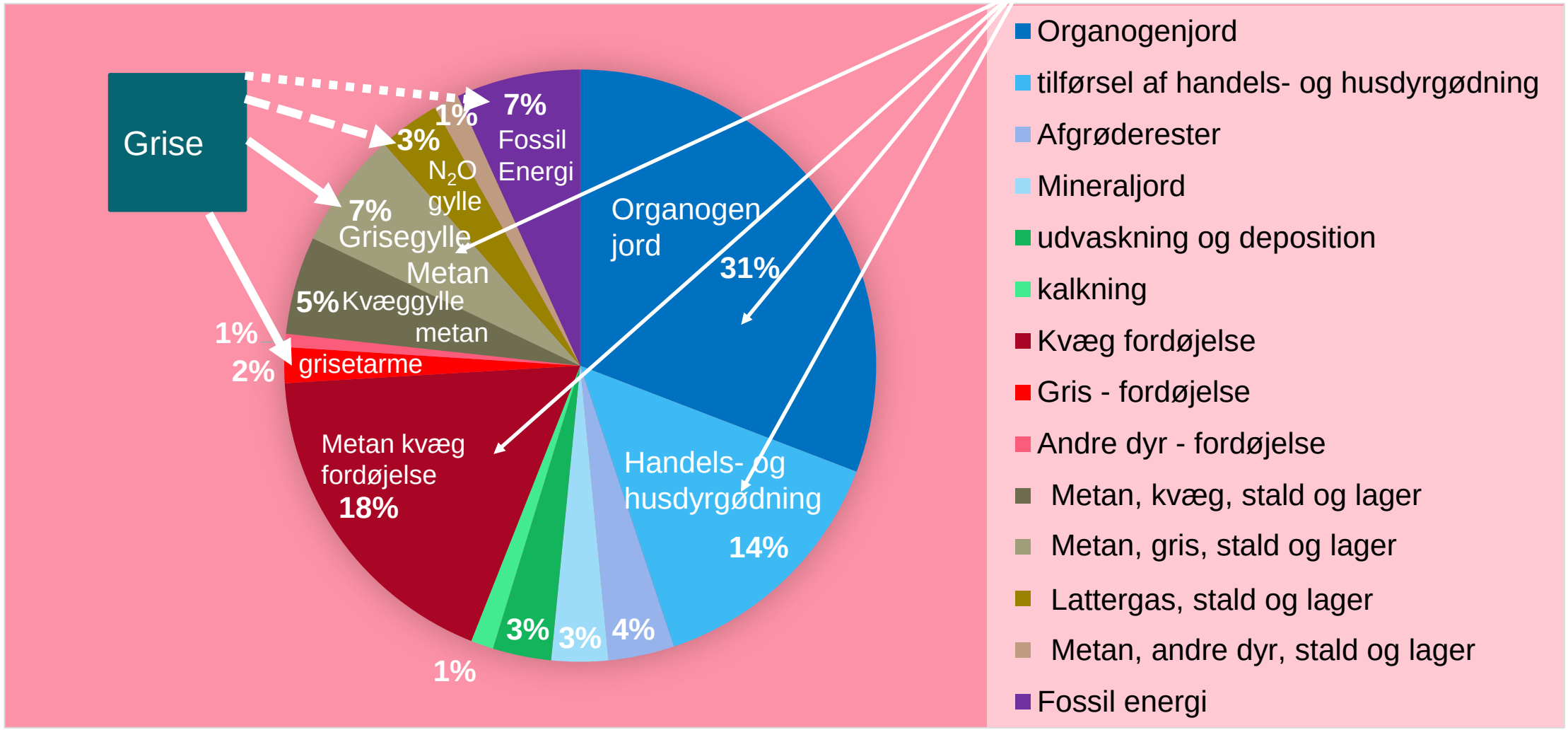
# Dansk landbrugs $CO_2$e-fordeling

Landbrugsaftalen

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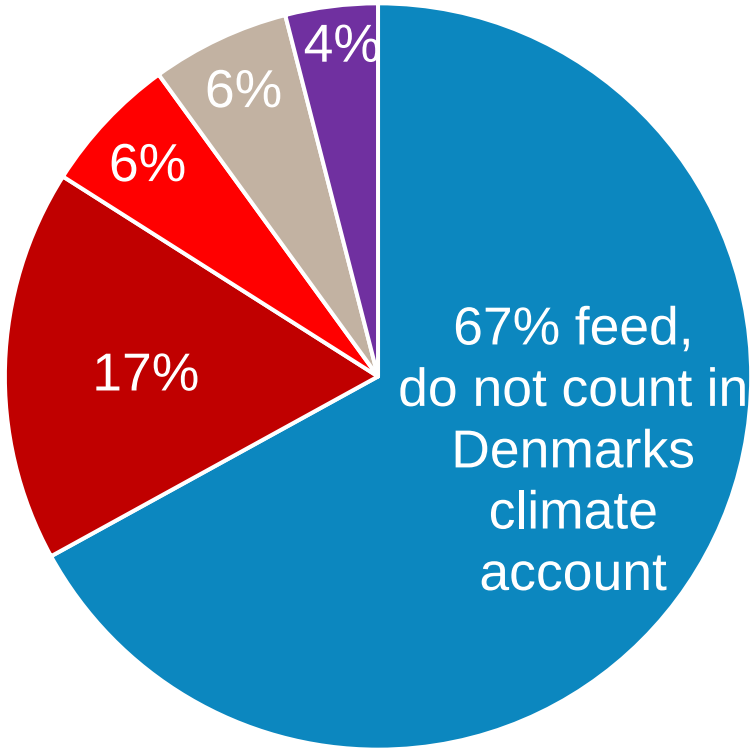
# Climate change impact, pig production, $CO_2e$
## - LCA method without dLUC

More fiber = more methane
Form pig
From slurry

Difficult to get lower methane potential

Standard emissions are not correct

Send slurry to biogas




- Feed
- Methane slurry
- Methane enteric
- $N_2O$ fertilizer
- Energy use

Climatic change impact of Danish crops counts in Denmark
- but counts in crop production and not pig production

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# Climate change impact of feed ingredients

**Very relevant for the LCA-method and the climate impact of pig meat (67% or more)**

**Not relevant in ”Denmarks Climate Account”**

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# Key concepts for climate change impact for feed ingredients

- LULUCF
- LU = Land use, direct emissions from growing the crop
- LUC = Land use change
- F = Forestry
- Deforestation (rain forrest) = LUC
- Direct LUC
  - Climatic impact of deforestation is accounted on the crops from newly (20 years) deforestated rain forrest – in practise soybean meal and soy bean oil from Brazil and Argentina
- Indirect LUC
  - Climate impact from deforestation (everywhere) is accounted on all feed ingredients from landuse per kg crop (grain, soy, sunflower)

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# To Models for climate impact of feed

- Direct without LUC
  - Direct impact from fertilizer, energy and loss from organic soils
  - Worst: Palm oil and sunflower seed meal (organogenic soils)
  - Landbrugets klimaværktøj (ESGreenTool)


- Direct incl. dLUC
  - Deforestation gives impact on certain ingrediens
  - Primarily soy bean meal and soy oil
  - Denmark will change to certified ”not deforestated soybeanmeal” soon
    - Easy concept to sell til consumers – and only marginal higher prices

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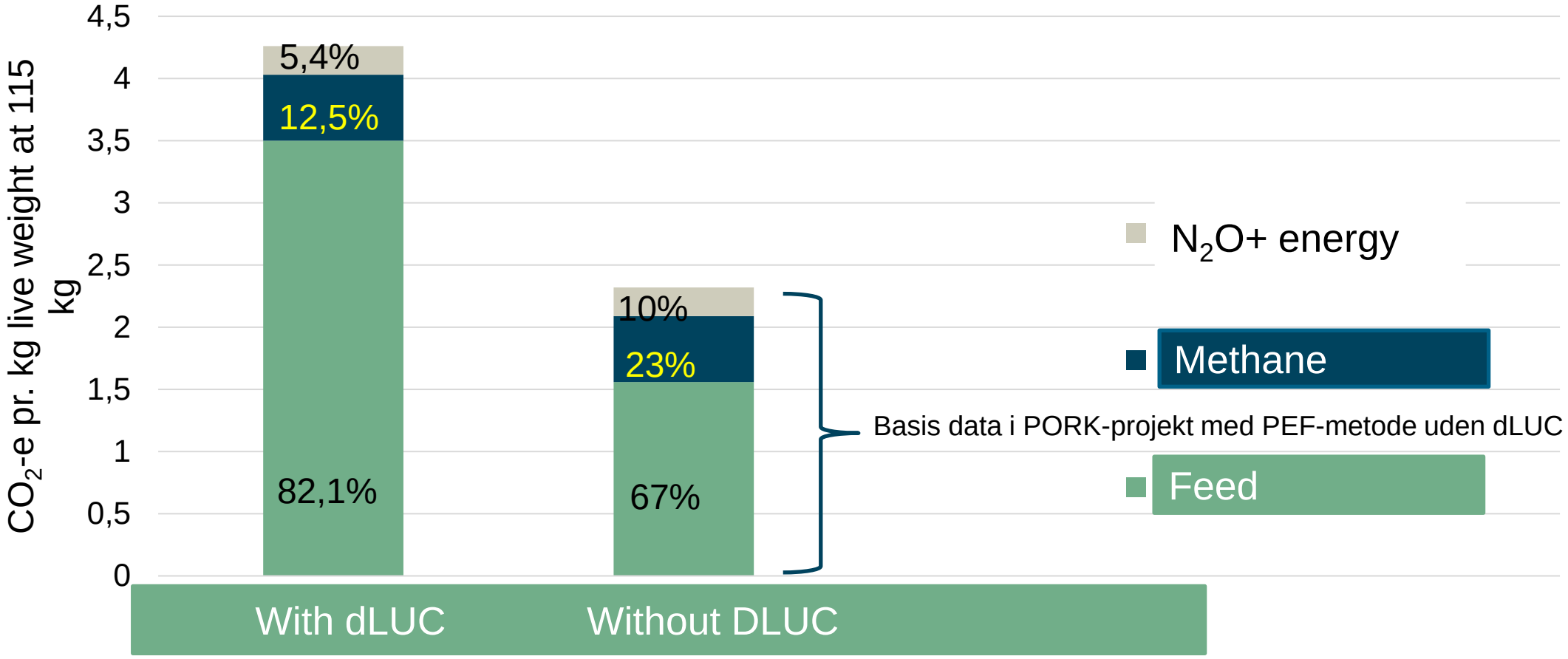
# Impact from feed on $CO_2$-e from pig meat with and without dLUC

## 2 year old numbers for national average feed

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# Ingredients after climate impact incl. and excl. dLUC – pr. FEsv

| Fodermiddel | Kg $CO_2$e Inkl. dLUC |
|---|---|
| Soy-protein, HP300 | 8,86 |
| Soybean meal | 5,67 |
| Soy oil | 3,54 |
| Palme oil | 2,00 |
| Potato protein | 1,98 |
| Solflower seed meal | 1,69 |
| Fishmeal | 1,27 |
| Frie amino acids | 1,11 |
| Rape seed expeller | 0,70 |
| Rape seed meal | 0,69 |
| Faba beans | 0,69 |
| Peas | 0,35 |
| Barley | 0,33 |
| Wheat | 0,33 |
| Rye | 0,31 |

certificeret

| Fodermiddel | Kg $CO_2$e Ekskl. dLUC |
|---|---|
| Potato protein | 1,98 |
| Soyprotein, HP300 | 1,70 |
| Palm oil | 1,64 |
| Sunflower seed meal | 1,41 |
| Fishmeal | 1,27 |
| Free amino acids | 1,10 |
| Soybean meal | 0,93 |
| Rape seed meal | 0,63 |
| Rape seed expeller | 0,53 |
| Soy oil / rapeseed oil | 0,48/0,49 |
| Faba beans | 0,39 |
| Peas | 0,33 |
| Barley | 0,33 |
| Wheat | 0,33 |
| Rye | 0,31 |

GFLI-database
Global Feed LCA Institute

PEFCR
Product Environmental Footprint Category Rules (EU)

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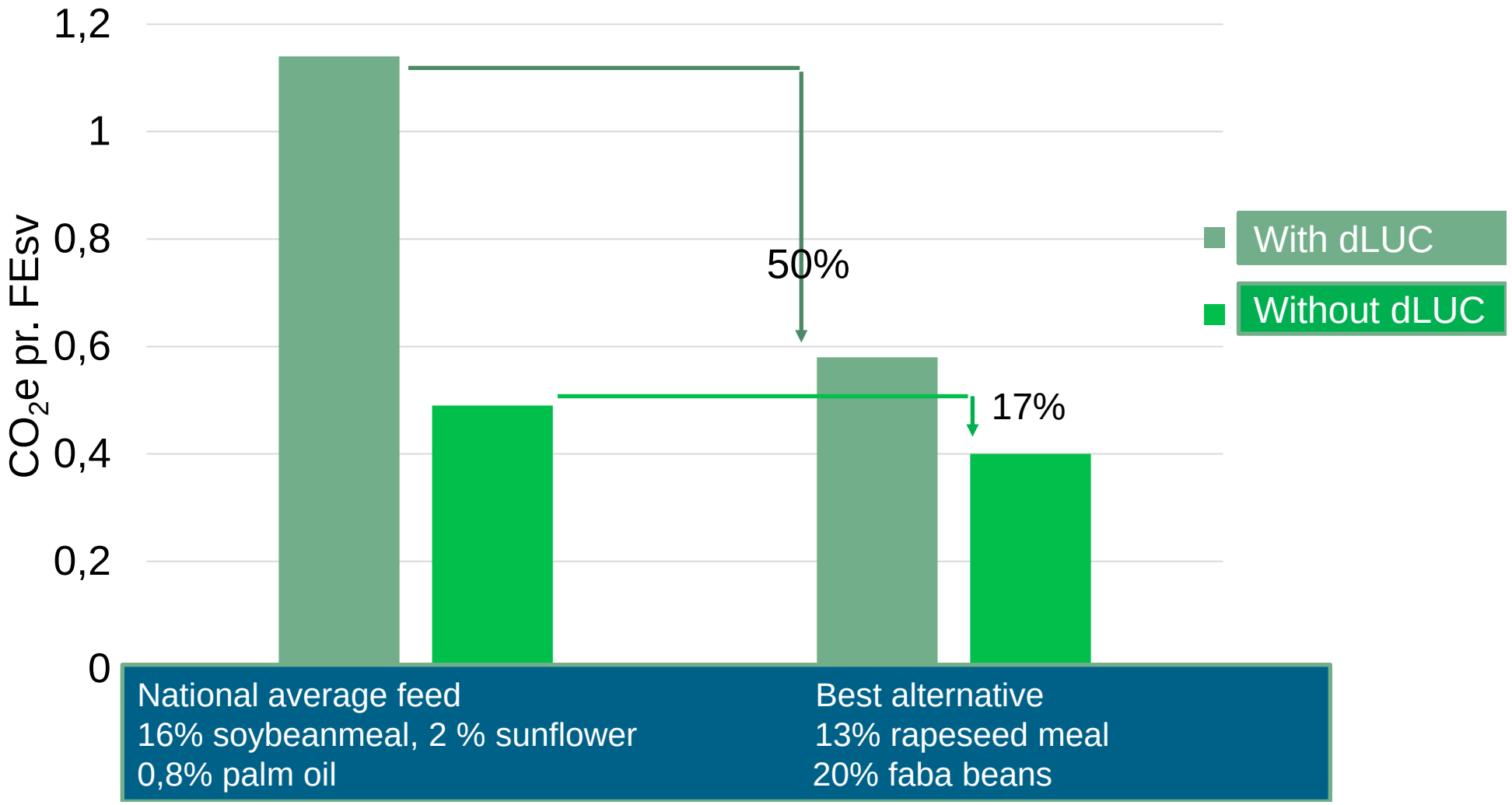
# Obtainable reduction in climate impact – in barley, wheat based feed

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# Competitors for insect proteinmeal and oil.

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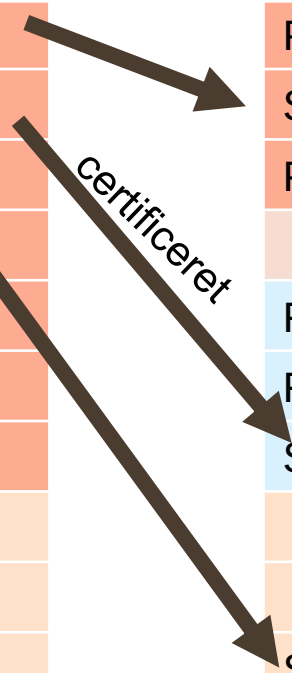


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| | |
| | |

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# Climate change impact of 1 kg insect  meal or oil

- Climate change impact ($CO_2e$) of feed
- Climate change impact of housing
- Climate change impact of processing
- Climate change impact of manure / offal / waste – eg Biogas ?
  - Emissions in housing and storage

- Dividing climate change impact on products
  - Protein meal
  - Insect oil
  - Normal procedure is dividing from economic value of products

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# Overall evaluation and questions

- Clima change impact is one measure –and difficult with varying feed for the insects
  - PEFCR includes 16 paramters
- What is substituted
- What is the effect on feed price
- What is the effect on growth and feed conversion

- Climate change ”accumulates” from original feed
  - Waste or high value feed fed to insects ?

  - Human food, Fish feed ?, Pet feed, Poultry feed, Piglet feed ?
  - Competition / synergi for biogas ?

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